

RECENT ADVANCES IN ANAESTHESIA FROM  
THE POINT OF VIEW OF THE GENERAL  
PRACTITIONER, WITH SPECIAL REFERENCE  
TO PRE-ANAESTHETIC NARCOSIS.

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Modern advances in medicine and surgery are gratefully received by the general practitioner. He is glad to know that Insulin can limit the ravages of diabetes, that pernicious anaemia is controlled by liver therapy, but he seldom encounters these diseases. Relief of pain and discomfort are his constant aim, and advances in medical science towards this make a special appeal. The introduction of new drugs for the production of anaesthesia and pre-anaesthetic narcosis have stimulated a fresh interest in this subject among general practitioners. It is for this reason I am prompted to record my experiences with the older types of anaesthetics, and to compare them with those of recent introduction.

Following my resident appointment in 1924, I became anaesthetist assistant to a surgeon, on the staff of a county hospital, for eighteen months, and since 1925 I have been a partner in general practice, in a town of sixty thousand inhabitants. In this practice the majority of the surgical work has been undertaken by my partners. Since 1930 I have held the post of honorary anaesthetist in a hospital of 120 beds. My records



cover a period of ten years. During these years my interest in anaesthesia has increased with the introduction of newer methods. It has further been stimulated by the pleasure derived from finding the relief my patients experienced since the introduction of pre-anaesthetic medication.

Since the text books and articles I have studied are the composition of experts, I can hardly add fresh clinical observations from my limited experience. My object in this Thesis is to summarise my findings as a practitioner, in close touch with my patients before and after anaesthesia. I shall mobilise my experiences under the following headings:

1. The peculiar problems of anaesthesia in general practice.
2. A general review of anaesthesia, with a description of the drugs used.
3. The requirements of general practice.
4. My own experiences and personal impressions, with notes from my records of cases.
5. General suggestions and an account of the way in which the general practitioner may be best equipped, both in the matter of personal skill and practical material, in his duty in connection with anaesthesia.

PART 1

THE PECULIAR PROBLEMS OF ANAESTHESIA  
IN GENERAL PRACTICE.

General practice, more than consulting anaesthetists practice, provides opportunity for the study of the anxieties patients experience before operation. The dread of anaesthesia is more prominent in the patient's mind than the thought of the surgical risk entailed. He is aware that the surgical interference will be painless, but he also knows that unpleasant sensations will be experienced during induction of the anaesthetic. If he has had no previous experience, his friends are only too ready to relate of the grim, choking struggle which takes place as consciousness is slowly lost. The more virile the patient, often the more apprehensive is his state of mind. This fear of losing consciousness increases the difficulties of induction, and I have found it well worth the extra time required to explain to my patients exactly which type of anaesthetic I propose to give and how I propose to give it, so that they come to the anaesthetic table assured that they will be treated with every consideration.

In its association with general practice, anaesthesia confronts the doctor with many problems - primarily, the personal factor - i.e. does the general practitioner



feel properly equipped to undertake the induction and maintenance of a correct degree of anaesthesia, permitting the performance of the operation with a minimum of shock and anaesthetic? Does he feel equipped to lead his patient through the various stages and not be led? Can he vary the depth as required, and lastly, can he recognise the different stages as they are reached? Confidence is only gained by experience, and opportunities for this are few and far between, but the problem may be met by a determination to be alert and to concentrate on the immediate task.

The anaesthetist and surgeon may be almost unknown to each other, and the latter, naturally, may be apprehensive regarding the anaesthetic and take few pains to conceal this. The practitioner can readily allay this fear. He can demonstrate an air of confidence in dealing with the patient and handling the apparatus, and produce a deliberate and unhurried induction. Not only have personal shortcomings to be overcome, and the surgeon satisfied, but there is the need to respect the wishes and idiosyncrasies of the patient. The public is being educated to the difference between anaesthetic agents: for example, there is a growing demand for pre-anaesthetic medication. Many patients are aware of the dangers of chloroform, and request that this drug may not be used. Some stipulate that the anaesthetic mask

shall be held away from the face, while others describe their dislike of gas and their inability to take it, and many other statements of a like nature. These unimportant matters mean much to the patient, and, in order to keep their minds at rest, these wishes must be taken into consideration.

Hospital conditions present no problem of this nature. As a rule, patients, uneducated in these matters, are unimaginative, and readily place an implicit trust in the anaesthetist. They go unquestioningly to the operation theatre, wait an unconscionable time in a side ward, obey the instructions given, and take the anaesthetic with an enthusiasm which greatly reduces the troubles of the anaesthetist.

Fear of the unknown is uppermost in the minds of many patients before anaesthesia, together with a dislike of losing consciousness, and the fear of the possibility that they may not return from it. Contrast this with the desire for relief from the pain of childbirth, when, from the patient's point of view, anaesthesia cannot be induced too early, and the fear that consciousness may not return does not exist. The personal factor may present itself when a child is subjected to a general anaesthetic. The doctor may have taken pains to gain the confidence of the child for many years. An operation becomes essential, and the doctor has the unpleasant

knowledge that this confidence may disappear, to be replaced by fear and dislike as a result of the anaesthetic. The introduction of pre-anaesthetic sedatives, such as Avertin, has put an end to the terrified screams of the struggling child, and ensures that cordial relations between the doctor and his small patient will continue.

Some minor operation suggests to the doctor that local anaesthesia is the most satisfactory measure. It is a curious fact that many patients are under the impression that in their case local anaesthetics have no effect. They attempt to prove their argument by relating the intense suffering caused when teeth were extracted under local anaesthetic. Here the doctor may accede to the patient's wishes, and give a general anaesthetic; or, carefully explain the reasons guiding him in the choice of anaesthetic he advises. The hospital patient does not receive such consideration. The doctor decides upon the type of anaesthetic, and proceeds to put it into practice.

The reputation of a doctor is gained by his attention to the apparently unimportant details in his practice, and should he be able to bring comfort to his patient by a pleasant anaesthesia, he will be repaid many times over. He will see the patient for many days after the operation, and he must not risk loss of esteem

in his methods or loss of confidence will ensue. The dread of an anaesthetic tragedy is an ever present one to the practitioner not well versed or experienced in general anaesthesia, since, should such a tragedy occur, its very rarity would make it conspicuous.

These problems may be faced by careful study of the most suitable anaesthetic for a given case, and by explanation to the patient of the method to be employed. It is found that many are grateful for simple explanations, and from them gain a feeling of confidence. Here the general practitioner has the advantage of the specialist anaesthetist, since he already knows and understands the prejudices possessed by his patient. In my practice I have found that pre-anaesthetic narcosis is an incalculable boon to nervous patients and children. It is of greater value than any other advance in general medicine within recent years. /a

In practice, lack of scope, absence of modern apparatus, or primitive conditions under which an operation is performed may be overcome where the anaesthetist has a determination to rivet his attention on his work. It is thus he will gain confidence in his administration of anaesthetics.

Generalisation on anaesthesia is not the purpose of this Thesis. It is a résumé of the methods I have employed whilst learning the use of anaesthetics, and I



hope it will demonstrate how general practitioners are attempting to follow the advances in the science of anaesthesia.

PART 2.

A GENERAL REVIEW OF ANAESTHESIA, WITH A  
DESCRIPTION OF THE DRUGS USED.

In the past, the science of the production of anaesthesia has made little appeal, and been of small interest to the general practitioner, - possibly because the signs and stages have been difficult to follow, or because the major interest lies in the actual surgical side of the operation. No doctor can feel impersonal towards his patient, and his interest is centred in the technique of the surgeon and in the desire to know if the diagnosis is correct. These factors tend to produce some apathy in the practitioner anaesthetist towards his own duties. Until recent years, the induction was an unpleasant experience for all concerned, but patient and doctor are now free from this, thanks to pre-anaesthetic narcosis.

My introduction to anaesthesia was by the open chloroform and ether method. In most cases, induction was brought about by pure chloroform followed by ether. At this stage I received my first shock and a lasting lesson. A patient with aortic incompetence and an aneurism of the popliteal artery was anaesthetised by me for an operation on this aneurism. Chloroform and ether were used with success. Some days later, it was

decided that a further operation was required. I commenced the anaesthetic with pure chloroform, and in a few moments my patient was dead. Since that time I have been very guarded in my use of chloroform, and now, apart from midwifery, I have almost ceased to use this drug.

Broncho-pneumonia frequently followed operation, and excessive use of ether made one apprehensive of this calamity. It is a curious fact that one rarely saw broncho-pneumonia outside hospital practice. Apart from morphia, no pre-anaesthetic sedatives were given, and as a student I never saw nitrous oxide and oxygen in use. Operations were frequently stopped because the patient required resuscitation, not from surgical shock but from the shock of the anaesthetic. These facts impressed me, and on leaving hospital I determined that my use of chloroform would be very restricted.

Later, I became assistant to a general practitioner surgeon. My chief was a busy man, and desired as little time as possible spent on induction, so I was forced to resort to chloroform and ether. In eighteen months I found that in few cases was I really happy about my anaesthetic. Seldom was an operation completed without a pause, during which it was necessary to lower the patient's head, or to resort to artificial respiration in order to restore the patient sufficiently to allow

completion of the operation.

This phenomenon, brought about by the fall of blood pressure which caused failure of sufficient blood supply to the respiratory centre, and followed by respiratory embarrassment, was due to two things.<sup>\*</sup>

1. Inexperience on my part in using too strong a concentration of chloroform.
2. An unduly rapid induction.

Inexperience and undue haste are the main obstacles which the general practitioner anaesthetist has to face.

Apart from respiratory failure, which in some cases was due to surgical shock through my anaesthetic not being sufficiently deep, I never had serious trouble in the two hundred anaesthetics I administered by this method. A report was issued by the American Medical Association as far back as June 1912 in which it was stated that "the use of chloroform as an anaesthetic for major operations is no longer justifiable". Impressed by this, I determined that wherever possible I would use drugs of a less dangerous nature for my inductions. My technique has radically changed, and this transition forms for me an interesting phase of my medical experience. It is for this reason that I propose to limit my essay to an account of those agents of which I have personal experience, and which can be utilised by

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\* Reference Modern General Anaesthesia, Poe, page 12.



any general practitioner.

The drugs which superseded my use of chloroform and ether are those pre-anaesthetic sedatives given by the mouth, by the rectum and intravenously, and those drugs in general use as inhalants - ether, nitrous oxide, ethyl chloride, etc. I propose first to describe those I use for pre-anaesthetic narcosis, and follow with a description of drugs used as inhalants.

#### DRUGS ADMINISTERED ORALLY.

The simplicity of this route gives it preference over others, but, of course, drugs given by the mouth require a longer time to produce sleep than those given rectally or intravenously.

Nembutal is administered in capsule form, and has the following advantages. It is easily administered, has a soothing effect on the patient, and is reasonably rapid in its action. Through the effects of this drug, the patient can pass the hours preceding operation tranquilly. Nembutal does not require the presence of the practitioner at the bedside, and should be used only as a sedative. \* I administer one capsule, gr.1 at bedtime on the evening preceding operation, one capsule at 11 a.m. next day, and two capsules one hour before the

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\* General Practitioner, 1932, March 15th, page 365.

anaesthetic timed for 2 p.m. As a rule, the patient passes into a light sleep, from which he readily wakes on being moved. He slumbers again, however, and afterwards has little memory of the journey to the operating theatre.

Uncertainty in its action is one of the great disadvantages of Nembutal. Some combine it with morphia<sup>\*</sup> but I do not consider this practicable for the general practitioner. When using one sedative, I dislike adding another to it.

The effect of Nembutal appears to have little relation to the size of the patient. I have had more than one experience, where small individuals have been unaffected by it, and where stout ones have lost their reflexes. There is also a tendency when giving this drug at different intervals before operation for the dose given several hours beforehand to produce sleep almost at once, but for the dose given immediately before operation to have little effect. This can be very disconcerting to the doctor, who has promised his patient freedom from the sights, smells, and sounds of the operating theatre. I am disappointed in this drug, so I limit its use to those cases where Avertin is contra-indicated, i.e. operations on the bowel, rectal polypi, anal fissures, and in elderly debilitated patients.

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\* Anaesthesia and Analgesia, 1930, September and October, page 210.

Nembutal answers well in old people, and I have found it useful recently in two cases. One, a woman of seventy, undergoing removal of the vulva for carcinoma; the other, a stout woman of seventy-two, about to have a diagnostic dilatation and curettage. Neither was unconscious after the Nembutal, but induction was rendered easy in both cases, and there was no difficulty in using only gas and oxygen to continue the anaesthetic. Nembutal was also useful for a woman suffering from asthma, Mrs. P. She was scarcely asleep, and conversed with me on the way to the theatre, but on regaining consciousness, stated that she remembered nothing after swallowing the capsules. Hysterectomy was performed, and ether was added to gas and oxygen to gain sufficient relaxation of her abdominal muscles. In contrast, Mr. R. a man of forty, weighing 13 stone, remained in complete possession of his faculties after receiving Nembutal capsules, and roundly abused me for my incompetence.

Nembutal is a safe drug, not always effective, but gives the doctor no anxiety. The same quantity of ether is required for a satisfactory anaesthesia, had Nembutal not been used. It is definitely valuable in elderly patients. It is the only drug of the bitturates which I have used as a pre-anaesthetic sedative by the oral route.

DRUGS ADMINISTERED RECTALLY.

Avertin is probably the drug most generally used to produce pre-anaesthetic narcosis, and so far back as 1929, whilst in quest of a suitable substance to reduce the discomforts of general anaesthesia, I learnt of Avertin. Since then, with the exception of a short period during which I substituted intravenous Nembutal, I have used it as a routine.

Avertin has completely revolutionised anaesthesia for the general practitioner. Surely this drug is the most potent weapon we have to combat the anxieties and discomforts of our patients about to undergo operations. No longer do we find the screaming child held firmly by nurses, twisting its head from side to side in order to avoid the terror being forced upon it. Instead, there supervenes a quiet sleep, unconsciousness before the child leaves the bed-room, and a continued happy relationship between the doctor and his small patient.

The technique of administration is admirably suited to general practice. Avertin has drawbacks, but these I believe are outweighed by the advantages it possesses.

Disadvantages.

1. It is necessary for the anaesthetist to be present, half an hour before the commencement of the operation, in order to administer the drug.
2. It is hardly suitable where there is a long operating list, as in hospital practice.
3. It lessens the value of the pupillary reactions as



a sign of depth of anaesthesia.

4. Shallow breathing is produced, and therefore induction is rather protracted. A few inhalations of carbon dioxide at once increase the depth of respirations and overcome this difficulty.
5. The blood pressure is frequently lowered. This is readily controlled by the use of ephedrin gr.  $\frac{1}{2}$ .
6. Once Avertin has been administered it cannot be returned.
7. Constant care and attention from nurses is required during the recovery period, since the tongue may drop back and cause respiratory embarrassment.
8. In children, there is a tendency to return the substance on the operating table.

#### Advantages.

1. It is claimed for Avertin, like Nembutal, that when used to produce pre-anaesthetic narcosis less ether is used during the operation. This is not my experience. I find the quantity of ether little less than had I induced with chloroform, nitrous oxide or ethyl chloride.
2. Administration takes place in bed. There is no noise, smell or sight of the operating theatre, which relieves the patient of considerable distress. I have given Avertin to a child lying in its mother's arms before tonsillectomy. On returning to consciousness, the child was unaware either that it had received an anaesthetic, or that an operation had been performed.
3. No preparation of the bowel is required beforehand, thus Avertin can be used in emergencies as well as in cases more carefully prepared. When first I used this drug, I ordered enemas as a routine, but I have now discontinued these since I find results equally good with or without an empty bowel.
4. It definitely reduces post-operative sickness.
5. Nitrous oxide and oxygen are becoming more frequently used in general practice. I wish to emphasise the importance of Avertin as a pre-anaesthetic.

tic sedative where these agents are used, as it helps towards a relaxation which nitrous oxide alone cannot produce.

6. Where local anaesthesia is employed, as in thyroidectomy, Avertin is particularly useful. I have known a young adult receive Avertin followed by regional novocain for this operation. About an hour following the commencement of the operation, he came slowly round from the Avertin and kept up a running commentary until the operation was finished. There was neither discomfort nor shock.

7. Avertin prolongs post-anaesthetic sleep.

The method I employ for the administration of this drug is the one in general use, but I take the precaution of working by a table in which the "full dose" is that recommended by the manufacturers, the "normal dose" is for a person one stone less in weight. This is calculated by deducting 10% from the full dose. The "small dose" (useful for debilitated persons) requires a reduction of a further 10%. I rarely use the full dose. I use the normal dose as a routine, and the small dose under the circumstances I mention. I append a table with the dosage of Avertin for two patients weight 5 stone 6 pounds, and 5 stone 8 pounds.

Body Weight		Full Dose (.1cc per Kilo)		Normal Dose (.09cc per Kilo)		Small Dose (.08cc per Kilo)	
St.	lbs.	Minims Avertin	Dis- tilled Water	Minims Avertin	Dis- tilled Water	Minims Avertin	Dis- tilled Water.
5	6	58	5 ozs	52	4 $\frac{1}{2}$ ozs	47	4 ozs
5	8	60	5 ozs	54	4 $\frac{1}{2}$ ozs	48	4 $\frac{1}{2}$ ozs

Using this as a routine, I have administered Avertin in over 350 cases. There have been no fatal results, neither has it failed to produce satisfactory narcosis. In 1929 and 1930, I gave ephedrin gr.  $\frac{1}{2}$  as a routine half an hour after the administration of Avertin to counteract any fall in blood pressure. Since then I use a smaller dose of Avertin, and because the fall in blood pressure is not so profound the addition of ephedrin is not necessary. After pre-medication with Avertin, gas and oxygen whenever possible is the anaesthetic of choice, although for four years I used open ether alone.

In patients under a year old, the same problems do not present themselves as in the case of older children. Thus I have not used Avertin for babies.

Excitement appears to accompany the return to consciousness in a small number of patients. To the son of a colleague of mine, a nervous but otherwise healthy child, Avertin was administered before tonsillectomy. Ether followed as the anaesthetic. Both anaesthetic and operation were uneventful, but I was recalled to the nursing home shortly afterwards to find the nursing staff endeavouring to keep the child (who was screaming violently) in bed. It was necessary to administer morphia gr.  $\frac{1}{6}$  which restored quiescence. I believe this excitement occurs only in patients of nervous temperament, but on

inquiry nurses state that excitement is present more often than one imagines. It is satisfactory to note the praise of Avertin which is expressed by those patients who previously experienced anaesthesia by older methods.

Avertin is safe in the hands of the inexperienced, provided it is used in small doses, and as a means to induce sleep and not to induce complete anaesthesia. Used only to produce sleep, it does not guard against surgical shock.

On several occasions during the last five years I have used Avertin alone for complete dental extractions. It was found necessary to hold the patient down, and some were even sufficiently conscious to use abusive language, but in no case was there any memory either of this or of the pain of the extractions. In the same way, patients may arrive at the theatre talking incoherently, and even answering simple questions, but they have no recollection of this afterwards.

No longer do I use Avertin for dental extractions, since for this purpose Evipan, given intravenously, is a more satisfactory drug. Our profession naturally regards with suspicion a new drug or clinical method, and one still reads grave warnings against the use of Avertin. In some cases tragedies occur because some other drug, such as morphia, omnopon, etc; is used in



addition to Avertin. For safety, the general practitioner should administer this drug only as a pre-anaesthetic sedative, should give it slowly, and assume the patient to be lighter in weight by one stone than he is in reality, when calculating the dose to be given. To the family doctor, anxious to hold the esteem of his patient, and to give him every help, I commend Avertin for administration in practically all cases of major surgery. It lessens the shock of anaesthesia, and aids the surgeon by inducing a more complete relaxation.

Paraldehyde. I have used this drug on two occasions. It has no advantages that I can discover over Avertin, with the possible exception that the blood pressure is not lowered, but its disadvantages are so obvious that there is rarely a call for its employment in general practice.

#### Disadvantages.

1. It is difficult to calculate the proper dosage.
2. A large dose is required to produce sleep.
3. The unpleasant odour hangs over the patient's surroundings and remains in his mouth for days, making this type of pre-anaesthetic sedative very disagreeable.

#### Advantage.

It is less toxic.

DRUGS ADMINISTERED INTRAVENOUSLY.

Nembutal.

Avertin became unpopular in small hospitals owing to the difficulty in gauging the proper time for its administration. It was thought, that in Nembutal a satisfactory successor had been found. Given by the intravenous route, it appealed for three reasons:-

1. Rapidity in action.
2. An accurate dosage could be calculated, the drug being withheld as unconsciousness supervened.
3. Any idiosyncrasy readily became apparent.

To the patient the discomfort of an intravenous, as opposed to a rectal administration appeared to be a slight disadvantage.

The absence of delay in induction was indeed an advantage to all concerned, but it was found that there were definite drawbacks to the use of this drug. Administration was as follows.

With the usual precautions for sterility, etc: 1 c.c per minute of Nembutal solution was administered intravenously, while the patient counted aloud. As the counting ceased, so the injection ended. A maximum dose of 10 c.c. I never used. I found that patients varied very greatly in their response to this drug. Strong young adults became unconscious after 3 or 4 c.c., while frailer persons required sometimes as much as

8 c.c. As a rule, all went well, and with one exception I did not experience any real anxiety. A woman of 35, with low blood pressure, required 8 c.c to induce unconsciousness. The ethmoidal sinus was to be punctured. After Nembutal I continued with a combination of oxygen and ether through a Boyle's apparatus. Breathing became very shallow, the blood pressure dropped to 70 systolic, the pulse became weak and rapid, and respiration stopped. Ephedrin gr.  $\frac{1}{2}$ , coramine intramuscularly, and carbon-dioxide by the mouth restored normal conditions, but my confidence in the use of intravenous Nembutal was shaken. After one or two experiences of this nature I have come to the conclusion that Nembutal given intravenously is not a suitable drug for use in general practice. Perusal of the literature on this subject has confirmed my own observations.

#### Evipan.

Those engaged in general practice have felt for a long time the necessity for a drug which would give full anaesthesia for a brief space of time, which could be readily administered in the home, and which would be rapid in its action, and quickly eliminated.

Until recently, nitrous oxide and ethyl chloride were the anaesthetics used for this purpose, but the introduction of Evipan gave the general practitioner a

drug admirably suited to these requirements. Later I shall refer in detail to those conditions in which I have found it of use.

Evipan is easily administered and controlled, it is rapid in its action and speedily eliminated, requires no rest on the part of the patient either in hospital or at home, ~~and can~~ <sup>but cannot</sup> be used with ease in the consulting room. A satisfactory degree of relaxation is produced, and this without interfering with the reflexes. There is little reduction in the blood pressure, and after trial, I believe this to be a safe drug for normal persons between the ages of 15 and 70. My youngest patient to whom I have given Evipan was 14, and the oldest 75. This drug can be given with safety by the general practitioner, and the return to consciousness is so rapid that it is ideal in the majority of minor operations undertaken in general practice. A satisfactory feature of the drug is that the patient is frequently restored to complete consciousness before the doctor leaves the house.

Evipan has similar disadvantages to any drug requiring intravenous administration. I have mentioned that the blood pressure appears to be little affected, but that there is some reduction in tension throughout the body is shown by the value of Evipan in operations for glaucoma. A regrettable complication of Evipan



anaesthesia is that nervous persons tend to become violent on returning to consciousness. One case particularly impressed me. A middle-aged man received 9 c.c. of Evipan solution preceding complete dental extraction. The anaesthesia and extractions were satisfactory. I left the nursing home satisfied that conditions were normal, but was shortly recalled to find the nursing staff attempting to hold down my struggling patient, who, under the impression that he was being made captive by German soldiers, was doing his utmost to resist. This phenomenon would appear to occur only in persons of a nervous and anxious disposition.

The return to consciousness synchronises with the elimination of the drug. Where the patient is of a nervous disposition, it is my custom to order an appropriate dose of morphia should there be signs of excitability on re-awakening. Morphia controls this restlessness and prolongs the period of sleep, always an advantage in such cases.

These are the drugs I have found useful and safe as pre-anaesthetic sedatives, and in those cases where brief anaesthesia is required. I now pass to those drugs used for inhalation anaesthesia.

#### DRUGS ADMINISTERED BY INHALATION.

Nitrous oxide is undoubtedly the most useful in-

halant available in general practice. I shall describe nitrous oxide under two headings - firstly, as a means of induction preceding ether anaesthesia; secondly, in combination with oxygen as a general anaesthetic. Nitrous oxide is the stand-by of the general practitioner in all manner of minor operations such as dental extraction, incision of abscesses, and retains its reputation in this connection.

When first I ceased using chloroform for my inductions, I found that nitrous oxide was adequate and pleasant, and that it could be used without fear. The apparatus was easily transported and simple to use. When the first stage of anaesthesia was reached and breathing became automatic and the patient slightly cyanosed, I hurriedly substituted an open mask soaked in ether or, more frequently, a Clover's inhaler, for the face piece and bag containing gas. This method gave reasonably good results, but I often found that the substitution of concentrated ether vapour for nitrous oxide produced violent coughing and struggling. For this reason I replaced nitrous oxide by ethyl chloride.

Avertin now takes the place in induction of nitrous oxide and ethyl chloride. When Avertin and Ethyl chloride are not available, nitrous oxide is a more pleasant and rapid method of induction than ether alone. The advantages

of nitrous oxide over ethyl chloride are that nitrous oxide is odourless, and does not cause the same degree of sickness so frequently met with after the use of ethyl chloride.

#### Ethyl chloride.

Since nitrous oxide was only available in cylinders and called for the substitution of one face piece for another during anaesthesia, I decided to use ethyl chloride. This I obtained in glass containers holding 5 c.c. each. I wrapped one of these in gauze, and placed it inside the bag of my original Clover's inhaler. To induce anaesthesia, I broke the capsule, allowing the ethyl chloride to escape into the bag. I then applied the mask to the patient's face, and when the first stage of anaesthesia was reached, proceeded to slowly add ether. This answered admirably, and I have used this type of induction in over a hundred cases.

I find for children the best method of use is to spray a few c.c.'s of ethyl chloride on an open mask. For adults 5 c.c. is an appropriate dose, but it is necessary to graduate the dose according to the condition and size of the patient.

#### Ether.

The use of this drug is so general and well-known that I have no fresh comments to add, except to stress

its disadvantages. These are:-

1. It is very unpleasant.
2. It is very irritant.
3. Patients suffer shock from too prolonged administration.

There is no doubt, however, that it certainly is the most valuable anaesthetic drug in use. Its advantages are moderated, however, when one thinks of the post-operative bronchitis, the sickness and general discomfort resultant upon its use. For these reasons I am persuaded that nitrous oxide and oxygen is a more satisfactory inhalant where complete relaxation is not essential.

#### Nitrous Oxide and Oxygen.

It will be generally agreed that in this combination, where preceded by pre-anaesthetic narcosis, we have the most safe and satisfactory of all anaesthetics. It is readily available to the general practitioner; cottage hospitals and hospitals in small towns are usually equipped with a satisfactory apparatus. It is suitable for persons of any age and under all conditions. Simple to use, it does not require elaborate apparatus. It lacks the toxicity of chloroform, ether and ethyl chloride. The rapid onset of anaesthesia, followed by speedy return to consciousness with no sickness, bronchitis or heart strain, give this anaesthetic a place of its



own in the estimation both of the doctor and the patient. It has the added advantage that the depth of anaesthesia can be readily altered.

Two disadvantages of nitrous oxide and oxygen suggest themselves.

1. Muscular relaxation is most difficult to accomplish, especially in the abdominal muscles without previous sedatives or the addition of ether.
2. Since cyanosis readily occurs, constant watch on the part of the anaesthetist is essential.

The first disadvantage may be overcome by a rectal administration of Avertin, a hypodermic injection of morphia, or an oral administration of Nembutal. I have administered this anaesthetic in fifty cases, but never without one of the drugs I have described as pre-anaesthetic sedative.

PART 3.

THE REQUIREMENTS OF GENERAL PRACTICE.

A multitude of minor and major ailments which require some form of anaesthesia present themselves. I will classify these under the following headings.

1. Those conditions requiring a light, short anaesthetic.
2. Those calling for a more pronounced degree of anaesthesia.
3. Those in which some relaxation is required.
4. Anaesthesia to mitigate the pains of labour.
5. General anaesthetics for major procedures.

Where light and short anaesthetics are required.

This group embraces such conditions as whitlow, abscess, removal of drain, single dental extraction, paracentesis, painful dressings, etc. For these nitrous oxide proves a useful anaesthetic. The gas can be given in the consulting room, and as there is no sickness or unpleasant sequellae, the patient can return home with his general condition unimpaired by the administration.

The apparatus I use (Fig. 5 page 54) consists of (1) celluloid face piece with rubber covering, to which is attached a rubber gas bag, attached in turn by tubing to a gas cylinder. Between the face piece and bag, (b) there is an opening to which I can attach a graduated glass container for ethyl chloride, (c).

Those conditions calling for a more pronounced degree of unconsciousness would include: vaginal examinations, removal of cervical polypi, paracentesis, ischio rectal abscesses, suture of deep wounds, suture of the torn perineum, injection of piles, injection of anal fissures and complete dental extractions.

Evipan is useful for these and allied conditions. It is administered while the patient is in bed, or on a couch or table. No preparation is required, and the technique is similar to that of intravenous Nembutal. The substance is slowly injected while that patient counts, and as the drug takes effect the counting ceases. There follows a yawn, a tremor, and then deep sleep supervenes. To accomplish this, 4 or 5 c.c. are usually required. It is then my custom to slowly add a further 4 or 5 c.c., I know relaxation will be complete, and that the patient will be unconscious for 10 to 15 minutes. I pause for a moment, and then proceed with the operation.

Evipan is simple to use, is easily carried in the bag, can be administered by any practitioner, requires no special skill, and is safe if used in doses not greater than 10 c.c. I have administered Evipan to the same patient on four consecutive days with no ill effects. I prefer a nurse to be present, in order to ensure that undue restlessness is controlled during the

return to consciousness.

I would again emphasise the value of this drug. That it is safe, there is no doubt, and the dose can be repeated with safety should consciousness return too early. It is used as a routine in Westminster Ophthalmic Hospital for all cases of minor surgery, and in many hundreds of cases no fatality has occurred, nor has any anxiety been felt. Since general practice gives such scope for its use I strongly recommend it should find a place in the equipment of every medical practitioner.

Evipan is not always available, and cannot always be used in those cases where the patient is too stout or too young, or where the veins are difficult to find. In these cases, ethyl chloride can be substituted. This gives a longer and deeper anaesthesia than nitrous oxide, and since it can be sprayed onto a mask, it suggests itself as a useful substitute.

Those conditions in which muscular relaxation must be complete but where only short anaesthesia is required. Dislocations, fractures, manipulations of joints for adhesions etc. come under this category. Until recently it was necessary to produce full anaesthesia by using chloroform or ether. Evipan makes a satisfactory successor, and simplifies the operation. Under this drug such operations as manipulations of the spine,



setting a colles fracture, and stretching a sciatic nerve are easily accomplished.

Anaesthesia to mitigate the pains of labour.

There is no doubt that under the care of an experienced obstetrician, with trained nurses in attendance, a woman can expect to pass through her labour with little pain. She has every right to demand this relief, but only rarely is it experienced under the ordinary conditions of general practice. Scopolamine morphine narcosis has its dangers to mother and child. Avertin requires elaborate preparation and is uncertain in its action. It is only valuable in the third stage. There is difficulty in retaining it in the bowel under the conditions of labour, thus producing risk of infection.

Nembutal by the mouth in capsule form is likewise uncertain in its action and although sleep is induced between the pains, it is of little use in lessening the severity of these.

Labour presents grave difficulties to those anxious to obtain the maximum of relief for the patient. Chloroform, the drug commonly used, must be withheld until the approaching termination of the third stage. It is well tolerated in labour, but, causes delay, nausea and vomiting, and in some women increases the tendency to haemorrhage. Single handed, and occupied with the actual delivery, the physician frequently depends upon

a midwife to administer chloroform dropped on a mask, or ether through a Junker's inhaler. This calls for divided attention on the part of the doctor, and is therefore a method both unsatisfactory and wrought with anxiety. It is a practice of long standing, condemned by all, and yet, until recently, without alternative. Dr. Minnit has evolved an efficient gas and air apparatus which has gone far to solve the problem of anaesthesia in labour. Briefly, the advantages claimed for this apparatus are as follows.

1. Self-administration.
2. Relief from pain from the commencement of the third stage.
3. Absolute safety to mother and child.
4. Ready return to consciousness.
5. Total time of labour reduced.
6. No exhaustion in the mother, and no sickness.
7. Suitable for use in hospital or in private houses.
8. Inexpensive apart from the initial cost of the apparatus.

Are these claims substantiated in actual practice?

For eighteen months I used this apparatus in a small maternity hospital, and being impressed by the results, I purchased a portable apparatus, which I have used for twelve months. I reproduce a photograph to demonstrate the salient features (Fig. 1) The apparatus does not leave the container, (a). Valves and springs to ensure

correct mixing of gas and air (b). Pressure gauge recording the amount of gas in the cylinder (c). Face piece which has to be held closely to the face, since gas only escapes through the valve, B, on inspiration, (d). Expiratory valve (e).

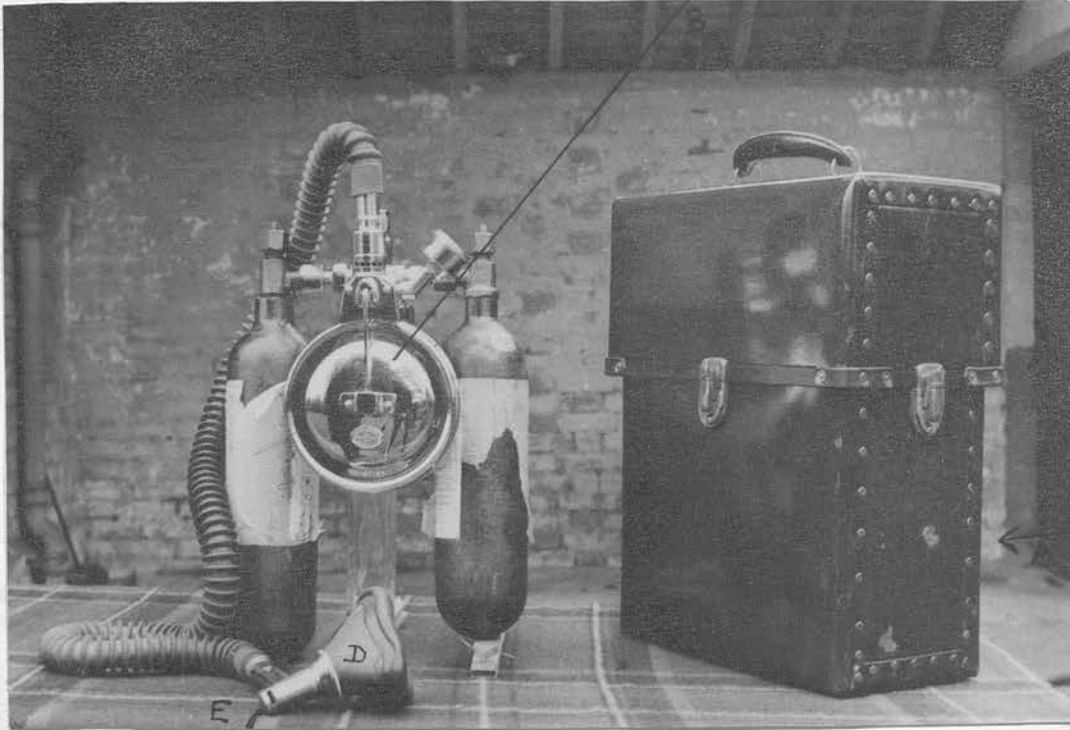


Fig. 1.

The method of use is simple. The apparatus stands beside the bed, the face piece lies within reach of the patient. Instructions are given that when the patient feels a pain about to commence, four rapid, deep breaths must be taken through the face piece. This should be completed before the pain reaches its height, otherwise the breathing is automatically held, and prevents relief

being obtained. Proper instructions to the patient in the method of use are important, since lack of these may bring the apparatus into disfavour.

My own experience with gas and air is satisfactory. Not all patients receive the same measure of freedom from pain, but in the great majority relief is prompt, and there is no delay in labour. One case in particular illustrates the advantages of the Minnit apparatus. A multipara, aged 35, being confined for the third time, contracted a tubercular pleurisy with a large effusion one week before term. The pulse rate was rapid, 120-130, the temperature 102-103; obviously she was not a suitable subject for the use of chloroform or ether. She came into labour in an exhausted state, but by the intelligent use of Minnit's apparatus she passed through her labour from first to last with great ease, and literally painlessly. It is satisfactory to note that she made an excellent recovery.

Since this method is analgesic rather than anaesthetic, I prefer the addition of an anaesthetic drug during the application of forceps, but I have applied them with gas and air alone. With Minnit's apparatus it is quite possible to suture a torn perineum painlessly - a feature not specially claimed by the inventor. Roughly, 100 gallons of nitrous oxide are used per confinement, but the temperament of the patient



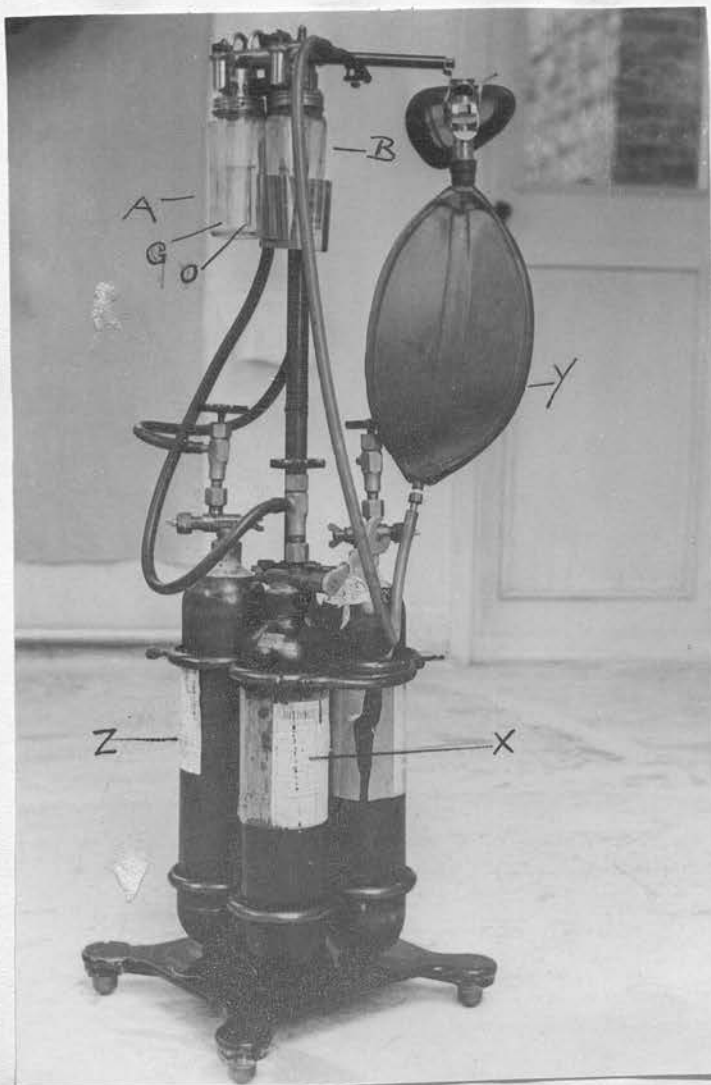
naturally influences the amount of gas which is required.

In conclusion, I suggest that this apparatus commends itself strongly where the ideal aim is a maximum of safety for mother and child, with a minimum of pain during labour. There are, however, always cases of difficult labour where no analgesic will obtain the amount of relaxation given by a general anaesthetic such as chloroform.

Consideration of the different agents for major procedures. This must be governed by the anaesthetic materials available, and the condition of the patient and his surroundings, i.e. nursing home, private residence, or hospital. For major procedures, I prefer, whenever possible, to induce pre-anaesthetic narcosis by Avertin, followed by gas and oxygen. Where the latter is not available, I use pure ether, and where pre-anaesthetic narcosis is not possible I induce with nitrous oxide or ethyl chloride and follow with ether. In the absence of these drugs, chloroform followed by ether, or chloroform and ether mixture are generally used. The general practitioner, therefore, has a varied choice in his anaesthetic agents. Most major operations in general practice are undertaken in hospital or nursing home, so it should be easy to obtain the maximum degree of comfort for the patient by employing Avertin or Nembutal, followed by gas and oxygen or ether. All agree that for lengthy operations, gas and oxygen is

ideal, but its limitations are recognised, particularly when difficulty is experienced in obtaining sufficient relaxation. Pre-anaesthetic narcosis overcomes this. With Avertin, Nembutal or morphia as a preliminary sedative, gas and oxygen can be made effective.

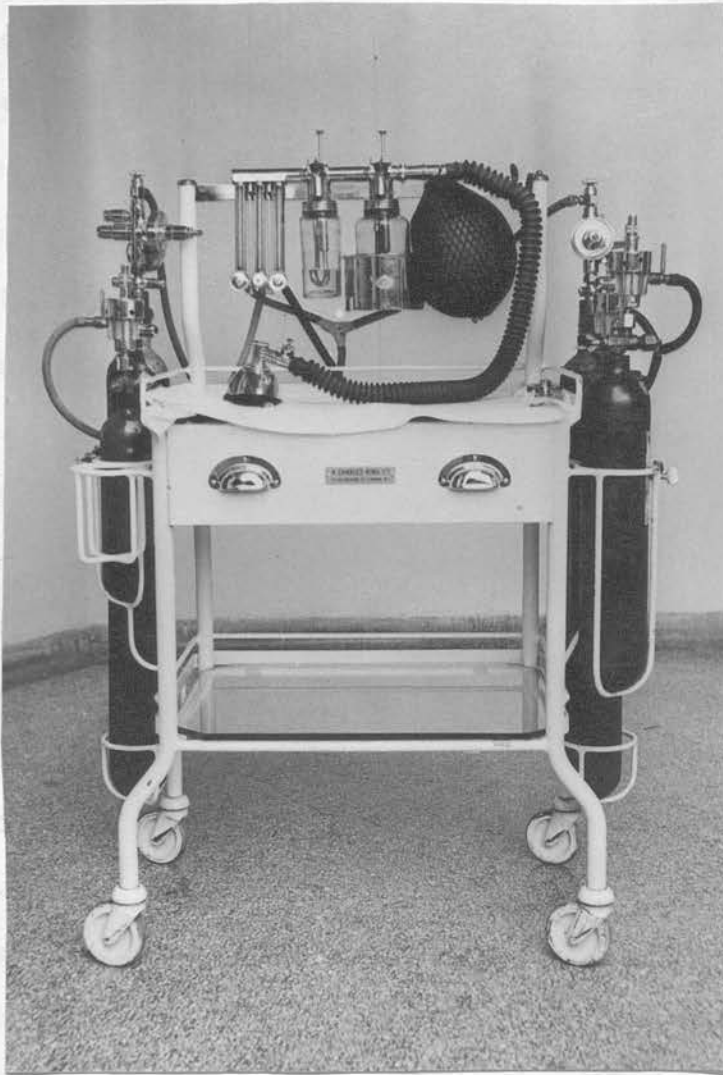
I use the continuous flow method with partial re-breathing. This is simple and reliable. It is interesting to note the increase of efficiency in a modern apparatus compared to one of an earlier date. I reproduce photographs taken of both types. Firstly, the older pattern which I still use regularly in a nursing home, and secondly, the more modern apparatus which I use in hospital.



Old apparatus. Fig. 2. Boyle

A sufficient dose of Avertin to cause sleep is given half an hour before the operation is timed to commence. The anaesthesia then proceeds thus. Pure nitrous oxide is bubbled through bottle A, until bag Y is filled. The patient rebreathes this, and as breathing becomes automatic, oxygen is added from the cylinder Z. On an average, five parts of nitrous oxide to two of oxygen make a suitable proportion. Bottle A contains water, and gas and oxygen are led through this by means of tubes G and O. The proportions are judged by the number of bubbles which come from these tubes. This is very crude, and it is here that the new apparatus shows a marked advance. The patient rebreathes for twenty respirations, the bag is then emptied and the process repeated. This ensures that there is not an excess of carbon-dioxide. It is necessary to keep the bag under slight pressure, especially at the commencement of the anaesthetic. If more relaxation is required, the mixture of gas and oxygen is bubbled through bottle B, containing ether. This has to be done gradually to prevent ether spasm or undue coughing. Should carbon-dioxide be required to stimulate flagging respiration, it must be led by a separate tube under the face piece. For years this apparatus proved effective and caused no trouble. The introduction of Macgill's instrument was a stimulus to obtain something better

than that in our possession. Macgill's apparatus, excellent in the hands of an expert, is not suited to conditions where the general practitioner is anaesthetist. For this reason, simplicity is the main consideration. This simplicity has been attained in the instrument now used. I consider it to be reliable and effective. Combined with an anaesthetic table, as it is in Fig. 3, it is easily movable, and not cumbersome.



New Apparatus.

Fig. 3.

Macgill.



There are two cylinders of oxygen, two of nitrous oxide, and one of carbon-dioxide. All are fitted with reducing valves (A and B, Fig 4.) The oxygen cylinders only have pressure gauges - it would be an advantage were the nitrous oxide cylinders thus equipped. Controls C and D. Fig 4, permit the entry of the gases to the flow meter, E. Fine adjustment screws, F, allow an exact measured amount of gases to pass to the bag. These are measured by a small, coloured disc, suspended by the pressure of gas in each flow meter. As these meters are graduated and the discs move up and down with the increase or decrease of pressure of gases, relative accuracy can be obtained. The anaesthetic then passes straight to the bag, or can be led over or through chloroform or ether, contained in bottles G and H respectively.

A broad, flexible, concertina tube leads from the bag to the face piece, and this marks a striking advance since the bag is away from the patient, out of the way, and allows easy mixing of the gases. Near the face piece is an adjustable valve X. When closed this permits complete rebreathing, and when open allows all degrees of partial rebreathing. The face piece is provided with a rubber band which keeps the mask tightly against the patient's face, allowing the anaesthetist to have both hands free for the manipulation of the instru-

ment. Although the apparatus looks complicated, it is delightfully simple to use, and the results obtained fully justify confidence placed therein.

From the stand-point of the general practitioner, this apparatus is the most satisfactory so far encountered. The old and the new apparatus are used in a similar way, with slight differences which I shall mention. After a pre-anaesthetic sedative, pure nitrous oxide is passed through the bag, rebreathing being complete until the first stage of anaesthesia is reached. Two parts of oxygen are then added, and five of gas, and the valve on the face-piece is slackened to permit partial rebreathing. This lessens the rapid, deep breathing found where rebreathing is complete. The respirations become shallower, and a satisfactory degree of anaesthesia is reached. Should greater depth of anaesthesia be required, the gases are passed over the ether bottle Fig 4, H. Greater depth still can be accomplished by pushing the plunger Z below the level of the ether in bottle H, and allowing the nitrous oxide and oxygen to bubble through the ether. It will be seen that this plunger allows a very gradual addition of ether to be made, and so the induction is smooth and uneventful. Should respirations become shallow, carbon-dioxide is easily added to counteract this.

Avertin, followed by the use of an apparatus of this

nature, constitutes an anaesthetic which gives complete comfort to the patient before, during, and after the operation.

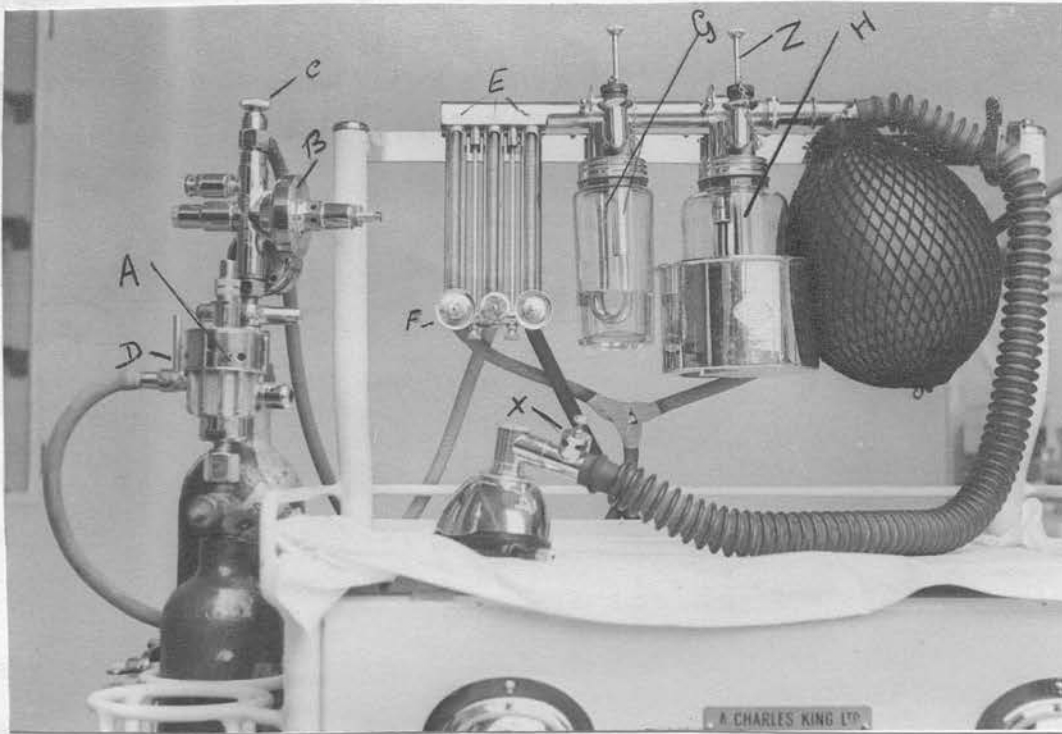


Fig 4.

There are frequent occasions when a gas and oxygen apparatus is not available, and then I rely upon ether alone. Ether induction is both slow and unpleasant, so when possible I use Avertin and follow with open ether. This is a satisfactory type of anaesthetic, but has a disadvantage. Since rebreathing is not possible, more ether is required. Clover's apparatus permits a rapid induction and slight rebreathing and lessens the amount

of ether required, and I have noticed when using Clover's inhaler, patients seem to perspire unduly, the body fluids being reduced in a way likely to increase surgical shock.

In an emergency pre-anaesthetic narcosis is not always available. A satisfactory method of reaching the first stage of anaesthesia in an adult is by the inhalation of 5 c.c. of ethyl chloride, decreasing to 2 c.c. for a child, and where the ethyl chloride is scented with eau-de-cologne, the unpleasant smell is reduced. When the first stage of anaesthesia is reached, ether can be added, and complete relaxation accomplished.

These methods cover the range of anaesthesia which may be required of the general practitioner. There is one exception, namely, tonsillectomy in children. This constitutes a problem of its own. Should the operation be performed in a nursing home or with experienced nurses in a private house, then Avertin followed by open ether is simple and effective. The child is comfortably asleep, ether can be administered by a mask or through a Junker's apparatus, and where Avertin has been used to produce sleep only, the reflexes are not abolished. In hospital, where a large number of tonsillectomies are performed in rapid succession, this method is not feasible, and so I use, I regret to say, a mixture of chloroform



and ether. I use this on an open mask from a drop bottle, and where the children are under the age of ten, anaesthesia is prompt. As an alternative, 3 or 4 c.c ethyl chloride may be sprayed on an open mask, and followed by open ether. This latter method is not so satisfactory, since a number of children are not made sufficiently deep with ethyl chloride to prevent much coughing and spasm when ether is administered. In hospital conditions, I have not yet discovered a satisfactory method of dealing with this type of operation, but one day I hope to be able to arrange that each child shall receive a pre-anaesthetic sedative before going to the operating table.

Since writing this, I have read of tonsillectomies performed in rapid succession in hospital where paraldehyde was the pre-anaesthetic narcotic. 1 dram of paraldehyde per stone body weight of the child was given a quarter of an hour before operation, in the proportions of one part paraldehyde to three parts of normal saline. This is followed by ether anaesthesia. For reason stated in a previous part of this Thesis, I do not like paraldehyde, but it is described as being simpler and safer than Avertin, and does not require the same accurate dosage.

PART 4.

MY OWN EXPERIENCES AND PERSONAL IMPRESSIONS,  
WITH NOTES FROM MY RECORDS OF CASES.

I have compiled a table of those anaesthetics I have administered since 1930. These have been undertaken in private practice, either at nursing homes or at the residence of the patient, and I have not included those anaesthetics given in hospital. I believe the former observations are more suitable to the title of this Thesis. In all, I have administered over 700 anaesthetics since 1924, but record a series of 340. I purposely do not include those anaesthetics I have given during labour, since pure chloroform alone was used until last year.

Tonsillectomy. The largest number of anaesthetics were administered for tonsillectomy, and the greater part of these have been after Avertin and ether. Invariably Avertin was given in sufficient amount to produce sleep. Ether was required to gain full anaesthesia. In this series of cases, no anxiety was experienced, and great satisfaction must be given to the medical man as he realises the comfort this form of anaesthetic brings to children. I have no failures to record for this anaesthetic where Avertin has been administered. Since there is no fear of an early return to consciousness,

there need be no undue hurry on the part of the surgeon, a matter of great importance where dissection is the method of operation.

Appendicectomy and Laparotomies. In private practice, Avertin and open ether were my choice since I had no gas and oxygen apparatus available. Where this class of operation has been performed in hospital, I invariably used gas and oxygen, and have no hesitation in repeating that Avertin followed by gas and oxygen is a more satisfactory anaesthetic than Avertin followed by open ether.

Circumcision. In the majority of cases this operation is performed on babies. These small patients present no difficulties, and open ether is both simple and effective.

Since relaxation is easy to obtain in the lower abdomen Gynaecological operations, such as colporrhaphy, hysterectomy, removal of ovarian cysts etc., are specially suited by an anaesthetic preceded by Avertin. One finds that Avertin with gas and oxygen provides all the necessary requirements in the majority of cases.

Laparotomies, and operations in the neighbourhood of the stomach, gall bladder etc., require a maximum of relaxation. Almost the same amount of ether must be administered after Avertin in this type of case, as would have been given had Avertin not been used. All

these operations are lengthy, therefore gas and oxygen is a suitable anaesthetic once the peritoneum has been opened and the viscera are being handled, but ether must be added in the early stages of operation and, as a rule, during the closure of the wound.

Operations on the breast. Relaxation here is not important. Amputation requires considerable time, loss of blood is often excessive, and shock may be great. The patient receives much benefit from pre-medication with Avertin, and gas and oxygen as the anaesthetic are quite sufficient.

Paracentesis. This operation is now performed more frequently by the general practitioner. For children, ethyl chloride sprayed on a mask is suitable; for adults, intravenous Evipan gives sufficient time for the operation to be performed with deliberation. I record nine cases in which Avertin and ether have been used for puncturing sinuses, and for radical operations on the sinuses and mastoids. In one case I used Avertin alone. This was on a colleague whose frontal sinus was punctured by the nasal route. The reflexes disappeared satisfactorily, and the surgeon commenced the operation. The patient groaned and moved his head, and only the skill of the surgeon permitted a satisfactory result. My colleague was unaware of any feelings of discomfort, but obviously complete mobility is required. Since



this experience, I always add gas and oxygen or ether.

Manipulations on the spine, sacro-iliac and other joints. I record thirty cases where I have used Evipan. The majority were entirely successful; there was one failure. A heavily built man was still fully conscious after receiving 10 c.c. of Evipan. Fearing to use more, I resorted to pure ether. He became excited and violent, and the manipulation was performed under great difficulty and without proper relaxation, but the other twenty-nine cases were uneventful. The quantity of Evipan used was from 3 c.c. to 9 c.c. The signs of anaesthesia in these cases were very similar. First, amnesia, then yawning, a slight muscular tremour followed in a few moments by sufficient relaxation to permit manipulation. Three cases received morphia gr.  $\frac{1}{4}$  one hour beforehand. This was given to relieve pain, and only 4 c.c., 5 c.c., and 3 c.c. respectively of Evipan were required to produce anaesthesia with relaxation.

Dental extractions. Fourteen cases of complete extraction under Evipan, and twelve under Avertin were performed. Evipan is the more suitable drug. Relaxation is quicker, anaesthesia is more rapid, and elimination is more speedy. The reflexes return quickly with less risk of blood being inhaled.

Minor operations. I have enumerated a few of those the general practitioner frequently meets. For my pur-

pose, they are of interest. Evipan is a drug admirably suited to minor operations; I am impressed by the steady pulse, good colour, and lack of respiratory embarrassment of patients under this anaesthetic.

Evipan is not a suitable drug for use in the consulting room, but in the patient's home with a nurse in attendance, it is ideal. In those cases which call for removal of nails, repair of a torn perineum, incision of a whitlow, dressing painful wounds, injection of piles and scraping of anal fissures, Evipan is a drug without equal. Where it has been used for these types of operation, I have no failures to record.

Before Evipan was introduced, I note eighteen minor operations performed under Avertin and ether. For the busy practitioner there is not time to wait until Avertin has had effect, and it means a prolonged stay for the nurse while the patient returns to consciousness. Although secondary to the welfare of the patient, these are further reasons for my belief that Evipan is the more suitable drug.

Those engaged in general practice would do well to interest themselves in this valuable drug.

	ETHER	AVERTIN & ETHER	ETHYL CHLORIDE & ETHER	NEMBUTAL	AVERTIN AND ETHYL CHLORIDE	GAS & OXYGEN	EVIPAN	CHLOROFORM & ETHER	AVERTIN	
Appendicectomy	2	33		1		5				
Tonsils & Adenoids		55	4	1 + Ether	3			1		
Circumcision	12	1	1							
Fractures		2	2			2	1			
Hysterectomy - ) Colporrhaphy ) Perineorrhaphy ) D. & C. - )	1	20	1			4				
Laparotomy - ) Partial gastrectomy ) Gastro-enterostomy ) Strangulated and ) femoral hernia - )	1 + Nembutal	8		2		4 1 + Morphia				
Breast abcess & complete removal		3	1	1		1				
Mastoid - ) Sinus operations ) Incision of ear drum )	2	9	2	1 + Ether	1	1			1	
Sigmoidoscopy - ) Prostatectomy ) Cystoscopy - )	3 2 +Nembutal	8	1	1		5			2	
Manipulation to spine & other joints		2				1	30	7	8	
Dental extractions			6				14	12	8	
Minor Operations. Removal of nails Sutures Hammer toe Varicose vein injection Whitlows & abcesses Removal of ganglion Sebaceous cysts Pile injections Treatment of anal fissures Lypomas Amputation of fingers Exostosis	3	13	16			2	12	2	5	
Total	26	154	34	6	4	25	45	22	24	Total 340



# SUMMARY OF ADMINISTRATIONS.

OPERATION	STATION	STATION	STATION
Amputation of fingers	38	184	34
Lipoma			
Treatment of anal fissures			
Pile injections			
Cebaceous cysts			
Removal of ganglion			
Whitlow & abscess			
Varicose vein injection			
Lampro toe			
Stitches			
Removal of nails	3	13	13
Minor Operations			
Dental extractions			8
Manipulation to spine & other joints		2	
Cystoscopy	2	8	1
Prostatectomy	2		
Sigmoidoscopy	2		
Insulation of ear drum	2	9	2
Sinus operations			
Mastoid			
Complete removal of breast abscess & removal of breast		2	1
Removal of hernia			
Stomach and intestines	1 +	2	
Partial gastrectomy			
Laparotomy			
D. & C.	1	20	1
Parathyroidectomy			
Gonorrhea			
Hysterectomy			
Proctures	12	1	2
Circumcision			
Tonsils & adenoids		55	4
Appendectomy	2	23	



PART 5.

GENERAL SUGGESTIONS AND AN ACCOUNT OF THE WAY  
IN WHICH THE GENERAL PRACTITIONER MAY BE BEST  
EQUIPPED, BOTH IN THE MATTER OF PERSONAL SKILL  
AND PRACTICAL MATERIAL, IN HIS DUTY IN CONNEC-  
TION WITH ANAESTHESIA.

Following the return to normal conditions after 1919, it was found that whereas major surgery before the war was rarely performed outside general hospitals, it was now undertaken in the smaller country hospitals by local practitioners. There are few districts, or small hospitals in which at least one of the local staff does not possess the surgical qualifications, or sufficient skill to undertake emergency surgical procedures. This necessitates co-operation on the part of the family doctor as anaesthetist, and general practitioners are thus more frequently required to become acquainted with general anaesthesia.

The B.M.J. April 20th, 1935, page 177, quotes a summary of the post graduate courses for general practitioners. The course upon the administration of anaesthetics is classed under the heading of "Special Subjects", and reads:-

"It is recognised that the administration of an anaesthetic is a speciality, and any course of instruction in a wide sense requires a long time,

and is well provided for in all systems of Post Graduate study. The general practitioner must, however, be prepared to give anaesthetics at short notice under certain conditions. He requires teaching in up-to-date methods of giving short anaesthesia, with simple apparatus, under such circumstances as dental extractions and minor operations, while the administration of anaesthetics such as Evipan will interest him."

It is my experience that rarely a week goes by when an anaesthetic is not required for a minor or major operation. Newer methods of anaesthesia are a great advance on the old, and I am sure more time should be allowed for instruction in their use. My own experience of Avertin, Nembutal and Evipan was gained by reading literature on these drugs, and testing it out on my patients. These drugs are so invaluable in general practice that I do not agree that a drug such as Evipan is only of academic interest.

I do not propose to discuss spinal, intratracheal, or local anaesthesia - local anaesthesia because it is administered by the surgeon, spinal and intratracheal anaesthesia because I feel they are definitely outside the scope of general practice. On the few occasions when I have given a spinal anaesthetic, I have not felt really qualified to administer it, owing to my lack of experience.

What, then, is the most satisfactory equipment which each general practitioner should have at his hands? The first consideration is his skill in administration. My



impression is that sufficient time for education in this branch of a doctor's work is not permitted in medical schools. It is conceivable that the student may leave hospital without having administered one anaesthetic. When first called to give gas for a dental extraction, I had never used a gas apparatus.

In the hospital to which I am attached, practitioners in the neighbourhood are permitted to give anaesthetics to their patients undergoing operation. Advantage is taken of this facility, and though their experience is limited, they use Avertin and gas and oxygen to the satisfaction of the surgeon. For the sake of their patients, practitioners should learn the use of pre-anaesthetic narcosis. Here safety must be the keynote of administration. This can be secured by the use of preliminary medication to produce sleep only, and, where possible, to follow this by gas and oxygen.

The doctor must watch with the utmost care and attention the various stages through which the patient passes. In general anaesthesia, more than in any other branch of medicine, the human organism invariably acts in one way, and therefore by carefully noting the various stages in a few cases, the signs are easily learnt.

This applies not only to general anaesthetics, but to other drugs such as Evipan or Avertin. A striking similarity presents itself in the use of Evipan particular-

ly, and its administration in two or three cases gives one sufficient confidence to gradually increase its scope. The general practitioner who has time to spare should devote it to watching gas and oxygen administered by those more experienced than himself. Similarly, the technique of intravenous Evipan is learnt after one administration. Safety can be ensured by giving a smaller dose than that recommended as the normal one. In the majority of cases, the smaller dose is effective, and I have never failed to produce satisfactory sleep by adhering to this rule. It is of paramount importance that the patient should receive a satisfactory depth of anaesthesia, and it is better with Evipan or Avertin to under-estimate than over-estimate the dosage.



Finally, what are the practical materials which will meet the requirements of general practice?

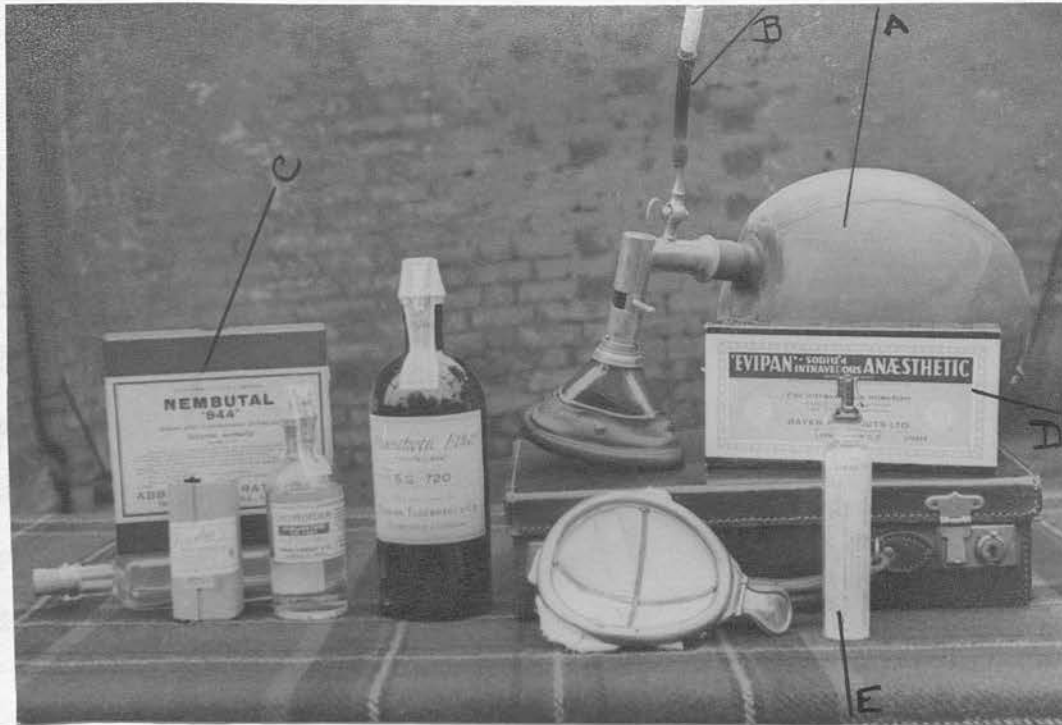


Fig 5.

I reproduce a photograph of the drugs commonly used.

(Fig 5.) The doctor should be provided with chloroform and ether in bottles of a different colour. This will prevent tragedies, which, happily, rarely occur. For the same reason, bottles should be of a different size.

Ethyl chloride is conveniently produced in glass cylinders for local or general use. For the latter, it is preferable when scented with eau-de-cologne. (E. Fig 5.)

For general use, Evipan is packed in boxes of six

ampoules of distilled water, and six of Evipan substance. It is then a simple matter to mix them. (D. fig 5.) A 10 c.c syringe for the administration of Evipan is required.

Avertin requires a rather more elaborate apparatus, and for this I recommend a small case, in which should be carried, a dosage table, a bottle of Avertin solution, 12 oz bottle of distilled water, a flask graduated in ounces for measuring distilled water, a glass graduated in minims to measure Avertin solution. For testing purposes, a bottle of Congo Red is required, with a small test tube and pipette. Finally, a No. 7 catheter for the actual introduction attached to a cylindrical glass funnel.

A stock of Nembutal capsules.

A supply of Nembutal for intravenous administration, which is packed in a similar way to Evipan. (C. fig 5.)

Finally, a Junker's inhaler, and a simple apparatus for the administration of nitrous oxide, will be found useful. There may be added a Clover's inhaler for ether anaesthesia, and Shipway's apparatus for operations about the head and neck, and lastly, Dr. Minnit's gas and air apparatus for maternity work. This completes the equipment required in general practice. These three latter apparatus form the more expensive part of the equipment.

There is a wise tendency in these days among general

practitioners to make use of drugs of a less toxic nature than chloroform. It is to be hoped that this evolution will proceed apace - yet emergencies do occur where modern drugs are not available. Let us therefore not omit from general practice a knowledge of the utility and method of administration of chloroform, the substance to which the doctor must pay tribute as the first drug to produce a practical general anaesthesia.